



west virginia department of environmental protection

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ENGINEERING EVALUATION/FACT SHEET

B BACKGROUND INFORMATION

Application No.:	R13-2290K
Plant ID No.:	099-00007
Applicant:	Department of Veterans Affairs (VA)
Facility Name:	VA Medical Center - Huntington
Location:	Huntington
NAICS Code:	622110
Application Type:	Modification
Received Date:	September 17, 2014
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	\$2,000.00
Fee Deposit Date:	September 22, 2014
Complete Date:	October 14, 2014
Due Date:	January 12, 2014
Applicant Ad Date:	September 16, 2014
Newspaper:	<i>The Herald-Dispatch</i>
UTM's:	Easting: 367.44 km Northing: 4,244.85 km Zone: 17
Description:	The application is for the installation of two emergency generators.

Process Description

Two Cummins Engine Model QSB7-G5 NR3 engines, which are compression-ignition, diesel fueled engines with a power output of 324 bhp at 1800 rpm, will be used to generate electricity on an emergency basis to support critical equipment at the Veterans Affairs (VA) Medical Center that is located near Huntington, WV. One generator set will have a rated output of 100 kW and the other one is at 150 kW. Both generator sets are using the exact same model engine.

SITE INSPECTION

On July 26, 2012, Mr. Michael Rowe, P.E., an inspection engineer assigned to the Compliance and Enforcement Section, conducted a routine compliance inspection of the medical center and found the emission sources to be operating within compliance of all permits and applicable rules and regulations. Thus, the writer deemed it is not necessary to conduct a site visit of VA Medical Center during the review of this application.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions from the Cummins Engine for these generator sets are indicated in the following table.

Table #1 – Emissions from Cummins Engine				
Pollutant\Sources	E-Gen Mobile 2		E-Gen Mobile 3	
	lb/hr	tpy	lb/hr	tpy
Oxides of Nitrogen (NO _x) plus Hydrocarbons*	1.93	0.48	1.93	0.48
Carbon Monoxide (CO)	0.50	0.13	0.50	0.13
Sulfur Dioxide (SO ₂)	0.002	0.001	0.002	0.001
Particulate Matter (PM)/ PM less than 10 microns (PM ₁₀)/ PM less than 2.5 microns (PM _{2.5})	0.05	0.01	0.05	0.01
Carbon Dioxide Equivalent (CO ₂ e)	199.80	49.95	256.11	64.03
Total Hazardous Air Pollutants (HAPs)	0.002	0.001	0.002	0.001

The emissions are based on gross engine output of 324 brake horsepower with annual operating schedule of 500 hours per year. Sulfur dioxide emissions were based using ultra-low sulfur diesel (ULSD), which has a maximum peak sulfur concentration of 15 ppm.

REGULATORY APPLICABILITY

The VA Medical Center as configured at the time of submittal of this application is classified as a minor source under Rule 13 and is classified as an area source for Hazardous Air Pollutants (HAPs). The proposed generator sets are classified as a modification of a minor stationary source and subject to the review process in 45 CSR13. As such, the applicant prepared and submitted a complete application, paid the required filing fees under 45 CSR 22, and published a legal ad in accordance with 45CSR 13.

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NSPS

New Source Performance Standards (NSPS) apply to certain new, modified, or reconstructed sources meeting criteria established in 40 CFR 60.

Subpart IIII

Subpart IIII (Standard of Performance for Stationary Spark Ignition Internal Combust Engines) applies to stationary spark ignition engines manufactured after July 1, 2007. These generator sets will be equipped with a compression ignition engine manufactured after July 1, 2007, which makes the engine affected sources subject to regulation.

To comply with this subpart, the VA has elected to purchase certified engines as allowed under 40 CFR §60.4243(b)(1) and operate such engines according to the manufacturer's emission-related written instructions as required in 40 CFR §60.4243(a)(1). The two model engines proposed in this application are certified for the 2014 model year under the following Engine Family and Certificate Number that was issued by U.S. EPA:

Table #2 U.S. EPA Certificate Numbers for Part 60 Compliance			
Generate Set Model	Engine Manufacture	Engine Family	Certificate Number
100DSGAA	Cummins Inc.	ECEXL0409AAD	ECEXL0409AAD-007
150DSGAC	Cummins Inc.	ECEXL0409AAD	ECEXL0409AAD-007

NESHAP

The VA Medical Center is classified as an area source of HAPs. The following will discuss the key applicable portions of applicable regulation that apply to the engine for the generator set.

Subpart ZZZZ

The internal combustion engine for the emergency generator set is classified as an affected source under the NESHAP for Stationary Reciprocating Internal Combustion Engines (Subpart ZZZZ). The proposed engines will have a power output rating of 324 bhp and be operated as an emergency use engines. §§63.6590(c) and (c)(1) states that for engines located at an area source of HAPs, if the source meets the requirements of Subpart IIII that no requirements of Subpart ZZZZ apply to the engine. Thus, the proposed engines are not subject to any requirements of this subpart.

No other federal regulations or state rules are applicable to the engines. The VA Medical Center is currently a deferred Title V Source under 45 CSR 30 because one or more of the existing boilers at the facility are subject to 40 CFR 60, Subpart Dc. The proposed emergency generators do not affect the facility's status and will remain as a Deferred Title V Source.

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TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The new emission units will not emit any pollutants that are not already being emitted by another emission source at the facility. Therefore, no information about the toxicity of the hazardous air pollutants (HAPs) is presented in this evaluation.

AIR QUALITY IMPACT ANALYSIS

Based on the annual emission rates, the proposed construction is not classified as a major source as defined by 45CSR14, so air quality modeling was not required.

MONITORING OF OPERATIONS

Subpart IIII of Part 60 sets specific monitoring and record keeping requirements for this limited use engine, which are mainly focused on documenting the purpose of operating the engine and performing regular, routine maintenance. No additional monitoring is deemed necessary.

CHANGES TO PERMIT R13-2290J

Permit R13-2290J covers four existing boilers and nine emergency generators at the medical center. Conditions 4.1.1. through 4.1.9., and 4.1.17. through 4.1.19. are specific to the boilers. These boilers are dual-fuel units that can either use natural gas or fuel oil (diesel). The VA Medical Center operates these units primarily on natural gas with diesel as a back-up fuel supply. The current permit set limits on gas & oil usage and limited the time operating on oil.

The writer put together the following table to see the facility's potential emission with regards to major source levels, which is 100 tons per year for each criteria pollutant.

Table #3 Medical Center Potential to Emit based on Permit Emission Limits			
Pollutant	NO _x	CO	SO ₂
Source	TPY	TPY	TPY
Boilers (gas)	11.87	18.45	-
Boiler (oil) ¹	6.77	1.20	16.92 ²
Generators ³	13.61	2.23	-
Current Total	32.245	21.875	16.92

1 - Annual emission when using oil is limited by hours of operation.

2 - Based on using 0.5 % by weight fuel oil.

3 - Based on annual operating schedule of 500 hours per year

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For these boilers, the emissions are set based on fuel type. Another issue with the individual emission limits for each boiler is that the four boilers vent to a common stack. Thus, conducting emission testing to demonstrate compliance with each requires the applicant to only operate one unit at a time, which might not be practical for a hospital. The solution to this issue is to set the limit in terms of lb of pollutant per heat input with one limit for natural gas and another for fuel oil.

The medical center only has one fuel oil storage tank and receives one type of oil, which is ULSD, which is fed to all of the boilers and generators. The boilers are subject to Subpart Dc which limits the SO₂ emissions to 0.5 lb per MMBtu or 0.5 weight percent sulfur on the fuel oil. The potential SO₂ emissions from the boilers would be 0.41 tons of SO₂ per year.

The preferred means of compliance with the SO₂ standard of Subpart Dc is using a certified fuel supplier. Limiting the fuel oil for the boilers to ULSD, allows the streamlining of several requirements into one condition in the permit (40 CFR §60.42c(d), 40 CFR §60.4207(b), 45 CSR §10-3.3.f) and one means to show compliance, which would reduce the hospital's potential of SO₂ emissions by 16.5 tons per year.

The writer recommends the following actions for the boilers:

- Restrict the fuel type for the boilers to natural gas except during supply shortages (curtailments) and 48 hours for readiness/maintenance checks. This approach allows the units not to be classified as affected units under the federal rule covering boilers located in area sources of HAPs.
- The individual fuel usage limit is not practical and should be replaced by a total annual heat input limit for the four boilers.
- Establish a CO limit for emission point 1E (Boiler Stack) using gas and oil on a heat input basis. This limit is based on the sum of the potential mass emission rate for the boilers using gas and oil then divided by the sum of the heat input from the boilers.

$$EL_{CO} = \left(0.073 \frac{lb}{MMBtu} \times \sum HI_{gas} \right) + \left(0.037 \frac{lb}{MMBtu} \times \sum HI_{oil} \right)$$

Where:

EL_{CO} = Emission Limit for CO in terms of lb per hour.

HI_{gas} = Heat Input of natural gas in terms of MMBtu/hr

HI_{oil} = Heat Input of oil in terms of MMBtu/hr

- Establish a NO_x limit for emission point 1E (Boiler Stack) using gas and oil on a heat input basis. This limit is based on the sum of the potential mass emission rate for the boilers using gas and oil then divided by the sum of heat input from the boilers.

$$EL_{NOx} = \left(0.047 \frac{lb}{MMBtu} \times \sum HI_{gas} \right) + \left(0.19 \frac{lb}{MMBtu} \times \sum HI_{oil} \right)$$

Where:

EL_{NOx} = Emission Limit for NO_x in terms of lb per hour.

HI_{gas} = Heat Input from natural gas firing, in terms of MMBtu/hr

HI_{oil} = Heat Input from oil firing, in terms of MMBtu/hr

- Require visible emission checks (Method 22) only when any one of the boilers has been operating on oil for 30th consecutive days to demonstrate compliance with 10% opacity limit of Rule 2.
- Omit Conditions 4.1.1. through 4.1.9., and 4.1.17. through 4.1.19. from the current permit and replace with the above suggestions for the boilers.

The generators in Permit R13-2290J have specific limits that are noted in Conditions 4.1.10 through 4.1.17. In addition to these conditions, Section 5.0 covers E-Gen, E-Gen 5 and E-Gen Mobile. Section 5.0 is the agency's G60 general permit. Only Conditions 4.1.10 through 4.1.14. should be carried over to the proposed permit as Conditions 4.1.3. through 4.1.7. for the generator sets not subject to the Subpart III of Part 60, which are generator E-Gen 25, E-Gen 23R, E-Gen 3a, E-Gen 3b, and E-Gen 2.

The VA Medical Center has only been purchasing and installing generator sets that the engine manufacturer has certified to meet the emission requirement of Subpart III of Part 60 (NSPS) since 2009. It is understood these certified engines are in compliance with the emission standard of Subpart if the owner/operator maintains and operates the engine in accordance with the manufacturer's written instructions. The only other requirements for these NSPS engines are the following:

- Use only Ultra-low Sulfur Diesel
- Operation of the engine for maintenance/readiness checks cannot exceed 50 hours per year with a total of non-emergency operation not to exceed over 100 hours per year.
- Track the hours of operation and purpose of operating the generator set.

The VA Medical Center has provided either the Certificate of Conformity for each of these engines or the compliance information published by the engine manufacturer. The facility only uses one type of diesel at the medical center for all of the boilers and generators which is ULSD. Condition 4.1.2. is established to reinforce the use of certified engines and included the limitation in accordance with the NSPS. The sulfur dioxide limitation in Subpart Dc (for the boilers) and Subpart III of Part 60 and 45 CSR 10 are streamlined into Condition 4.1.7. to limit the type of fuel oil to be used in all emission units to ULSD.

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RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that the VA Medical Center should meet applicable requirements of state rules and federal regulations. Permit R13-2290J does not have any limit to restrict the facility from triggering any other air program (synthetic minor source permit). Thus, the recommended change does not affect the facility's status as a minor source under the PSD or Title V permit programs. It is recommended that Department of Veterans Affairs be granted a 45CSR13 modification permit for their proposed emergency generator sets at the VA Medical Center located near Huntington, WV.

Edward S. Andrews, P.E.
Engineer

December 8, 2014
Date

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